

HILL FIELD, ENGINE REPAIR BUILDING  
(HILL FIELD, BUILDING 265)  
(HILL FIELD, GENERAL PURPOSE MAINTENANCE SHOP)  
(HILL FIELD, BUILDING 111)  
5840 Engine Lane  
Layton Vicinity  
Davis County  
Utah

**HAER No. UT-85-Q**

HAER  
UTAH  
6-LAY.V.  
2 Q -

**PHOTOGRAPHS**

**WRITTEN HISTORICAL AND DESCRIPTIVE DATA**

**Historic American Engineering Record  
National Park Service  
Department of the Interior  
Denver, Colorado 80225-0287**

# HISTORIC AMERICAN ENGINEERING RECORD

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HILL FIELD, ENGINE REPAIR BUILDING  
(HILL FIELD, BUILDING 265)  
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**Location:** 5840 Engine Lane, Hill Air Force Base, Layton Vicinity, Davis County, Utah

**UTM:** 12-418390-4551550

**Date of Construction:** 1941

**Architect:** Unknown

**Builder:** Unknown

**Present Owner:** Hill Air Force Base

**Present Use:** Maintenance

**Significance:** Aircraft engines were completely overhauled in Building 265 of the Ogden Air Depot (now Hill Air Force Base) during and after World War II. This building provides particularly vivid images of the processes involved in the repair and maintenance of aircraft, a crucial component of Hill Field's overall mission to support Pacific and European theaters of military operation during World War II. In addition, it contributes to a deeper understanding of the early development of the U.S. Army Air Corps, a branch of the Army which eventually became the U.S. Air Force. Hill Field was one of only two air depots established in the United States during the tumultuous years immediately preceding World War II.

**History:** Aircraft engines were removed from planes in the Aircraft Repair Hangars (Building 225) and brought to the Engine Repair Building (Building 265) for disassembly and complete overhaul. Completed engines were transferred to the Engine Test Cells (Buildings 267 and 268) for diagnostic testing before they were reinstalled on planes in the Aircraft Repair Hangars.

Building 265 was the primary engine repair facility of the base and it housed most engine repair operations. The Engine Repair Section was composed of five branches: the Cylinder Chrome Plating Branch, the

Disassembly and Cleaning Branch, the Engine Accessories Branch, the Engine Assembly Branch, and the Parts Overhaul Branch. Additional temporary units and subunits were created in accordance with various workload demands over the years. Most of these branches were located within Building 265.

Many adjustments were made to the process layout of the Engine Repair Building during its first months of service. An assembly line method was instigated, with metal covered work benches initially aligned perpendicular to the main direction of engine movement. The metal benches were gradually replaced by hardwood topped benches, which greatly lessened damage to delicate engine parts. Production lines were rearranged for greater efficiency along the assembly line, with individual work benches shifted to be parallel to the main engine progression.

Quotas set by Air Command were rarely met in the beginning months of World War II. Materials were often difficult to obtain and the majority of special tools were unobtainable and had to be designed and manufactured on the Base. As the war progressed, these obstacles began to subside. A shortage of special parts, tools, equipment, and adequate working space continued to present challenges, but in gradually reduced proportion. Many items continued to be manufactured by the depot shops as the needs for them became sufficiently urgent.

Parts shortages again surged during the Korean Conflict of the early 1950s. In order to expedite the completion of projects, parts like engines were frequently removed from the last planes in a repair line, repaired, and then reinstalled on planes that were ahead of the original planes. This enabled each early phase of production to proceed without delay, but often resulted in a crisis when the last plane was ready to receive unavailable parts. Sometimes, the parts arrived from other installations in time to complete the last planes in a line without delay, but often, the parts were unavailable from other sources and were manufactured locally.

In efforts to increase efficient production methods, all engine repair activity was carefully monitored and controlled by the Production Control Branch. The status of aircraft engines and other parts could be accurately determined at any of the various stages of production. The Branch obtained and decimated technical information to workers and handled technical correspondence, including all official long distance telephone calls pertaining to the engineering department. As the Production Control Branch gathered statistics, employees and materials could be more efficiently allocated among the departments.

Coordination between departments came gradually as the units began to understand their relationship to each other and as specialized labor and production line methods became widespread. Even with careful planning, though, operations progressed at different rates in each department. Frequent rush orders or parts shortages caused congestion in the production lines that disrupted the interdepartmental flow.

The majority of work in the Engine Repair Building involved the complete disassembly, overhaul, and reassembly of entire aircraft engines. Approximately 50 such engines were processed in August 1942. Production increased rapidly, though; within five months, 150 engines were completed and tested each month. In the first six months of 1951, 1,629 engines were completed, with an average of 545 man hours required per engine. Workers in Building 265 also performed periodic inspection and calibration tests, and prepared engines for storage by treating them with ethyl cellulose to prevent corrosion.

Partial engine components were also brought to Building 265 for repair. In the first six months of 1951, 2,946 carburetors, 1,303 water regulators, 1,771 fuel feed valves, 2,722 magnetos (ignition devices that produced alternating current for distribution to aircraft spark plugs), and 1,491 ignition harnesses were reconditioned.

Aircraft engines to be overhauled were first disassembled and thoroughly cleaned in Building 265. Surface carbon was removed by applying a tar-acid oil with brushes by hand. Engines were then placed in a soaking tank system that remained in use for many years after the end of World War II. Until spray booths and air-pressure guns were introduced in 1943, all cleaning was done by hand in open tanks. Sand blasting was rarely used because it required much extra work to mask and protect delicate bearings and finished surfaces.

The Engine Repair Building also housed the Carburetor Branch, which was organized to overhaul, repair, and calibrate all types of aircraft carburetors. It was established in January 1942, under Mr. R.H. Engleske. The first five months of its existence were spent recruiting and training new personnel, and gathering material, equipment, parts, and tools. Initial instruction for new workers lasted three months; miscellaneous types of carburetors which were available in the shop were provided for hands-on training. Some of the aircraft expected to be repaired by the Carburetor Branch used a new Holley & Stromberg pressure carburetor which could not be procured for training purposes. Mr. Mondell Bennett, assistant foreman of the new shop, provided schematic illustrations and lectured about the processes involved in their repair.

The Carburetor Branch used one 9-inch lathe and several sheet-metal covered work benches that occupied about 600 square feet in the Engine Repair Building. Their first project was to perform minor Technical Order modifications on various float-type carburetors. In the beginning, technicians worked on a single, stationary carburetor until it was completed. After six months of operations, though, a horseshoe-shaped progressive assembly line replaced rows of individual work benches. This new layout reduced overhauling time on carburetors from 16 hours to less than seven hours each.

In 1945, a new engine cylinder overhaul and preparation line was organized in the Engine Repair Building. Grinding & honing machines for cylinders and valves were processed on a production line conveyor system. Cylinders were pickled with an acid solution that removed surface scale and oxides prior to being plated with chrome.

One of the recurring problems in the early 1950s was the excessive rejection of engines on the test block due to high oil consumption. Investigation disclosed that the finish on the cylinder wall of the engine was too smooth, caused primarily through the use of substitute honing stones of inferior quality. Rejected engines were routed back through the assembly lines, and cylinder walls were re-honed with a new type of stone that increased surface roughness by 50%. Upon re-test, the oil consumption of these engines was found to be within Technical Order tolerances.

The Final Assembly Unit of the Engine Repair Section was established in early 1942, with approximately 30 employees supervised by Mr. V.E. Taylor. In the beginning, two shifts processed 2-3 engines per day; workers overhauled and assembled various types of engines, including Pratt & Whitney R-1830, R-2800, and R-2600 models. Most of the employees had no previous experience with aircraft engines and Air Command Technical Orders (written instructions provided by the Production Control Division) were referenced for each step of the process.

After a few weeks of production, a third shift was organized and the interior of the building was reorganized in order to accommodate a much more efficient assembly line process. Each worker specialized in a distinct stage of the assembly on a particular engine type. One supervisor was assigned to monitor the operations of each engine type. As the final assembly work became more and more specialized, the quality and efficiency improved and became more

uniform. The department grew rapidly, and new workers were trained much more rapidly and predictably on single assembly tasks than what was initially achieved by trying to train them about all aspects of assembling various engines.

Machine tools that were used by mechanics in Building 265 were manufactured and repaired by the Machine Tool Unit, which was located in Building 272. The crew experienced many difficulties during World War II because competition with other defense activities eliminated the possibility of obtaining experienced aircraft engine machinists. In 1942, the foreman was the only worker familiar with aircraft overhaul work, and available equipment was very limited. Each engine being repaired in Building 265 required different jigs and unique procedures for accurate and precise work. Many jigs were unavailable, and several on hand were unidentified and unlabeled. Because employees were unfamiliar with their appearance and use, many projects were delayed. Like workers in the Final Assembly Unit, most of the employees referred to the Air Command Technical Orders for each step of the process, and workers did their best to improvise alternative procedures when a prescribed jig was lacking.

Engineers in the Production Control Section designed a torque wrench in 1951 that greatly improved engine repair efficiency. The wrench was used to remove and replace thrust nuts and crankshaft nuts that were found on the engine assembly. Previously, this job had been accomplished by a worker striking a five foot wrench with a seven pound brass maul (hammer). This procedure was both dangerous and time consuming, often damaged the nuts before they came loose. Using a planetary gear arrangement, the new torque wrench offered a 30-to-1 power ratio, and was designed with attachments that could fit into even the most inaccessible places. As its use became more widespread, additional attachments were designed to fit other assembly and disassembly workloads.

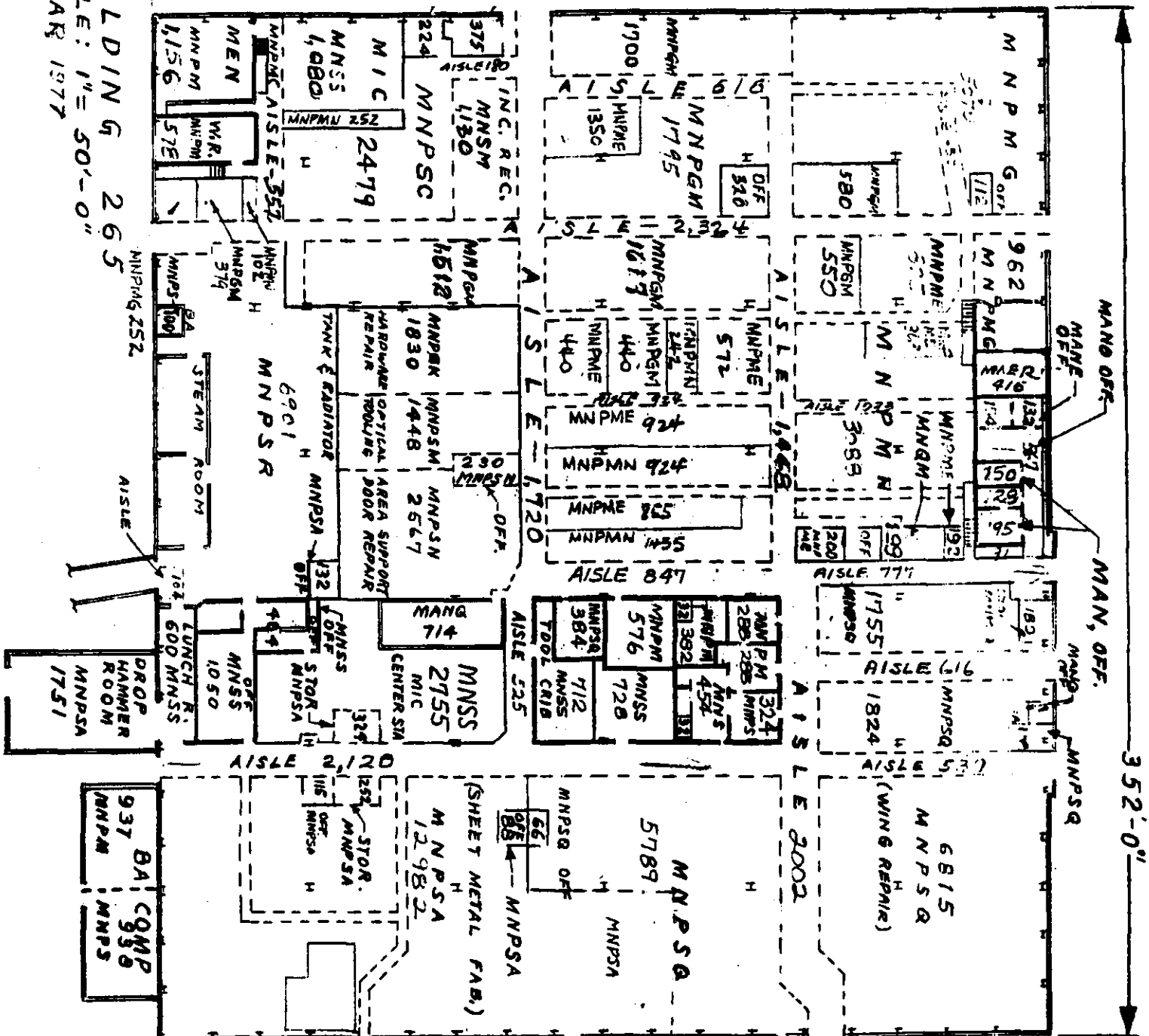
#### **General**

**Description:** Building 265 is a large, rectangular industrial building with no distinguishing stylistic elements. The facility's exterior wall consists of a concrete base and a continuous band of ribbon windows and vertical corrugated metal siding under the cantilevered roof. The front entrance is marked by two pairs of beige brick piers with a series of industrial steel sash windows which extend to the metal siding. Service and loading spaces are located in the southeast rear portion of the building.

The repair shop has experienced minor alterations since its completion. On the southeast (rear) elevation, a concrete block garage with a large overhead door has been added to the building. Only parts of the northwest and southeast elevation have any of the original steel sash windows remaining--the others have been replaced with plate and hopper windows. The mechanical units located on the roof have been upgraded as the building's functions have changed.

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BUILDING 265  
SCALE: 1"= 50'-0"  
MAR 1977



FIRST FLOOR  
110, 3/4 SQ. FT

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